

# Square-well model for cohesion in fluidized beds

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## Abstract

Cohesive forces are implemented into a discrete-particle, fluidized-bed simulation using a square-well potential. The square-well description treats cohesive interactions as instantaneous, binary events, thereby making it a viable option for the incorporation of cohesion into a kinetic-theory-based continuum model. Cohesive forces are also incorporated into the simulation using the more elaborate Hamaker description of van der Waals forces in order to provide a basis for assessing the square-well model. Both cohesion models are implemented in the discrete-particle framework of the MFIX software package. A mapping method is also developed to convert material-specific Hamaker constants into equivalent square-well parameters. The corresponding results from the two models are compared both qualitatively and quantitatively. The predictions of the square-well model are on par with the Hamaker model with respect to mixing level, particle mobility and minimum fluidization velocity. Subtle differences are observed between the two models in cases that involved such high levels of cohesion that the particle bed could not fully fluidize. (c) 2006 Elsevier Ltd. All rights reserved.

## Key words

Discrete particle simulation, Numerical-simulation, Experimental validation, Interparticle force

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